Spray mechanism for an aerosol product

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Equivalents:

Abstract

A container 1 containing the liquid to be sprayed and the vaporized gas for spraying in its inside is provided with a control member 2 having a spray hole 7, and when the control member 2 is manipulated, the liquid is sprayed by the gas pressure of the spraying gas. A sliding member 5 is provided in the control member 2, and reservoir or pools 44, 45 and a reservoir 76 are installed in the passage of the spray liquid and the vaporized gas. When the gas pressure in those pools is raised to the prescribed pressure, the sliding member 5 works to close the passage, and then the gas pressure in the pools drops, the passage is opened, and the gas pressure increases. As a result, the spray liquid and the gas are temporarily stored in the pools 44, 45 and the reservoir 76 until they are pressurized up to the prescribed internal pressure, and then sent into the spray hole 7, so that the spray liquid may always be sprayed from the spray hole 7 at a constant pressure and that constant spray state and state of atomization may be maintained at all times.

FIG. 1

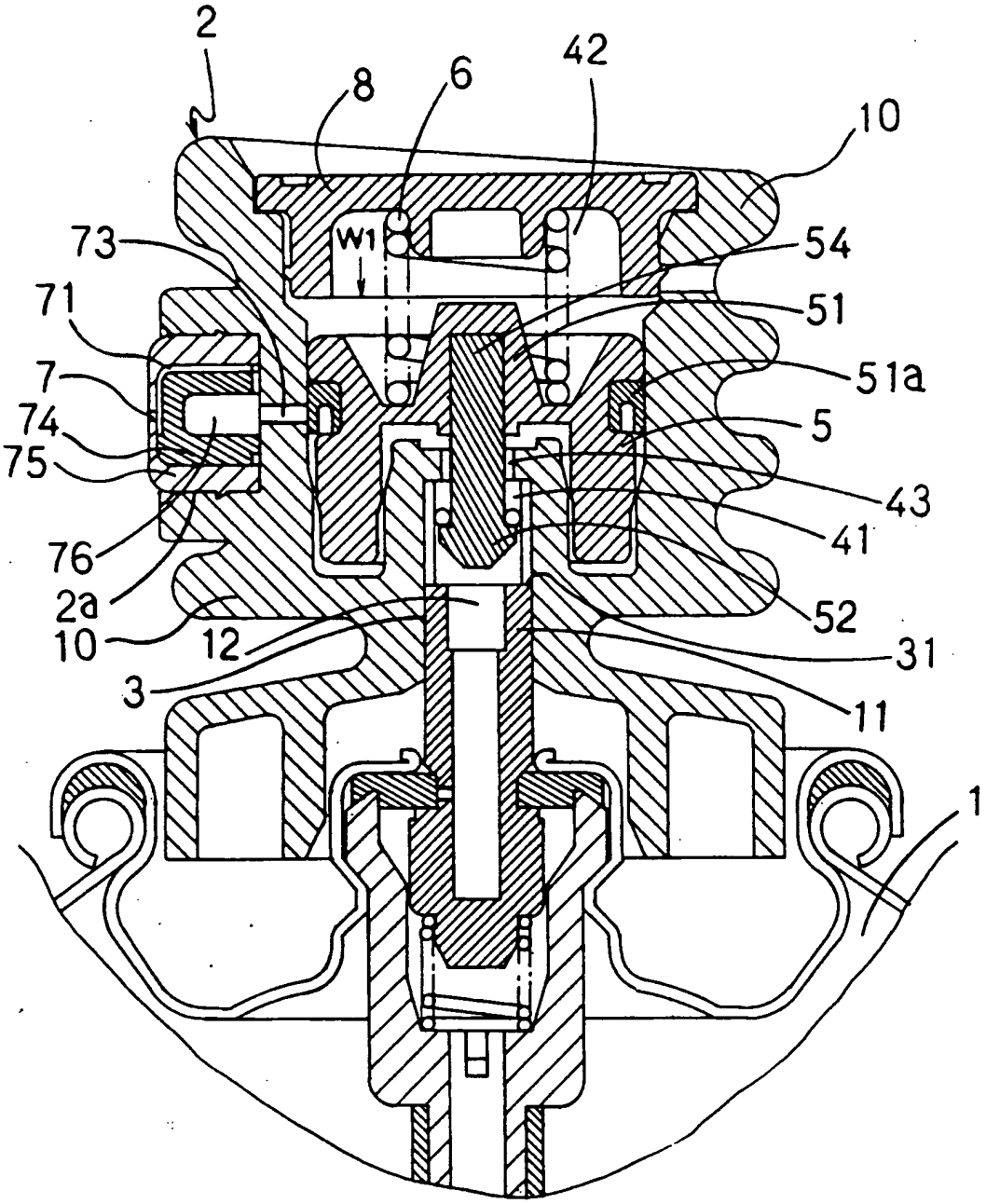


FIG.2

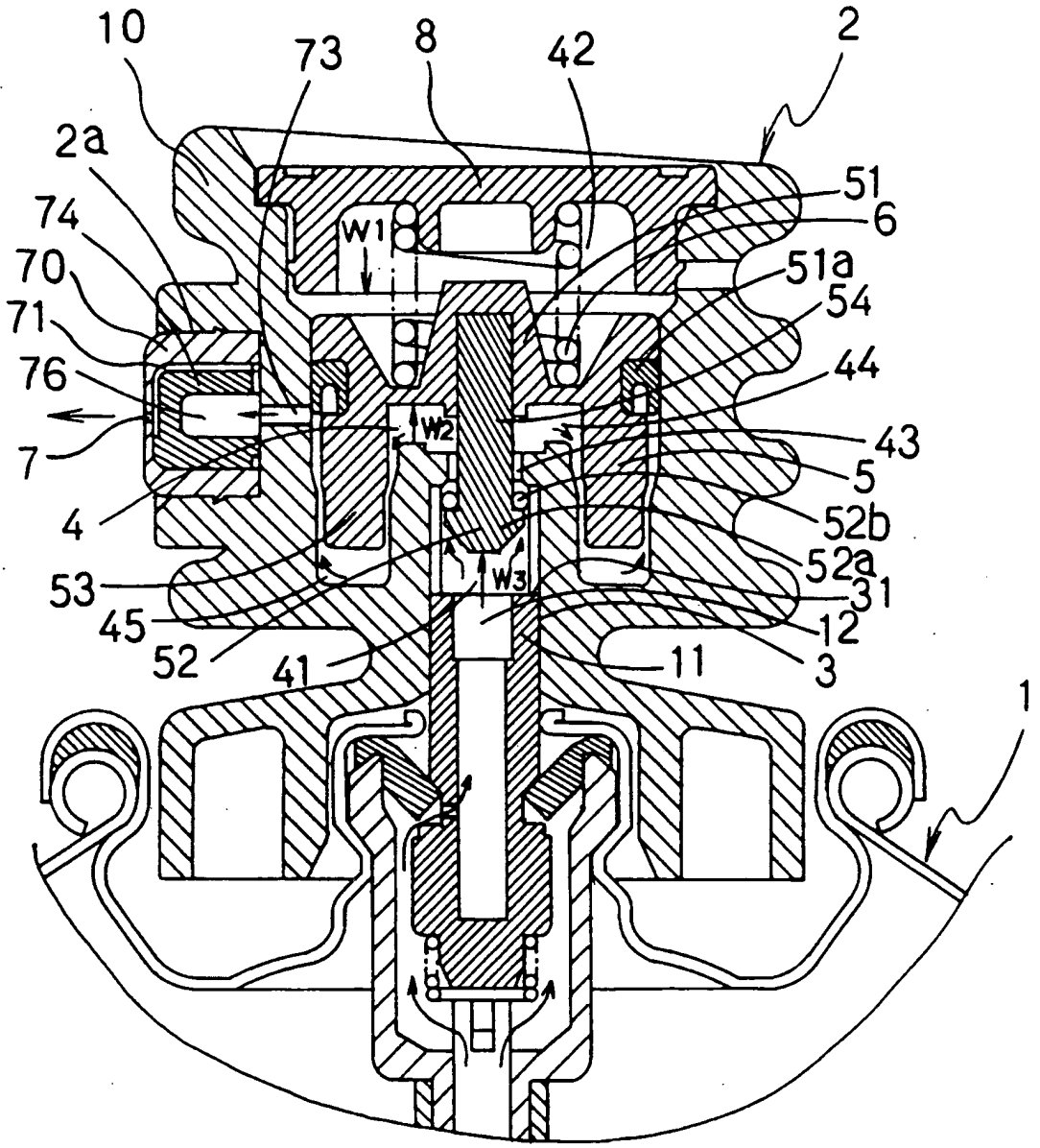

10
73
8
42
2
2a
51
6
74
W1
70
51a
71
54
76
44
W2
43
7
5
4
52b
W3
52a
53
31
45
12
52
41
11
3
1

FIG.3

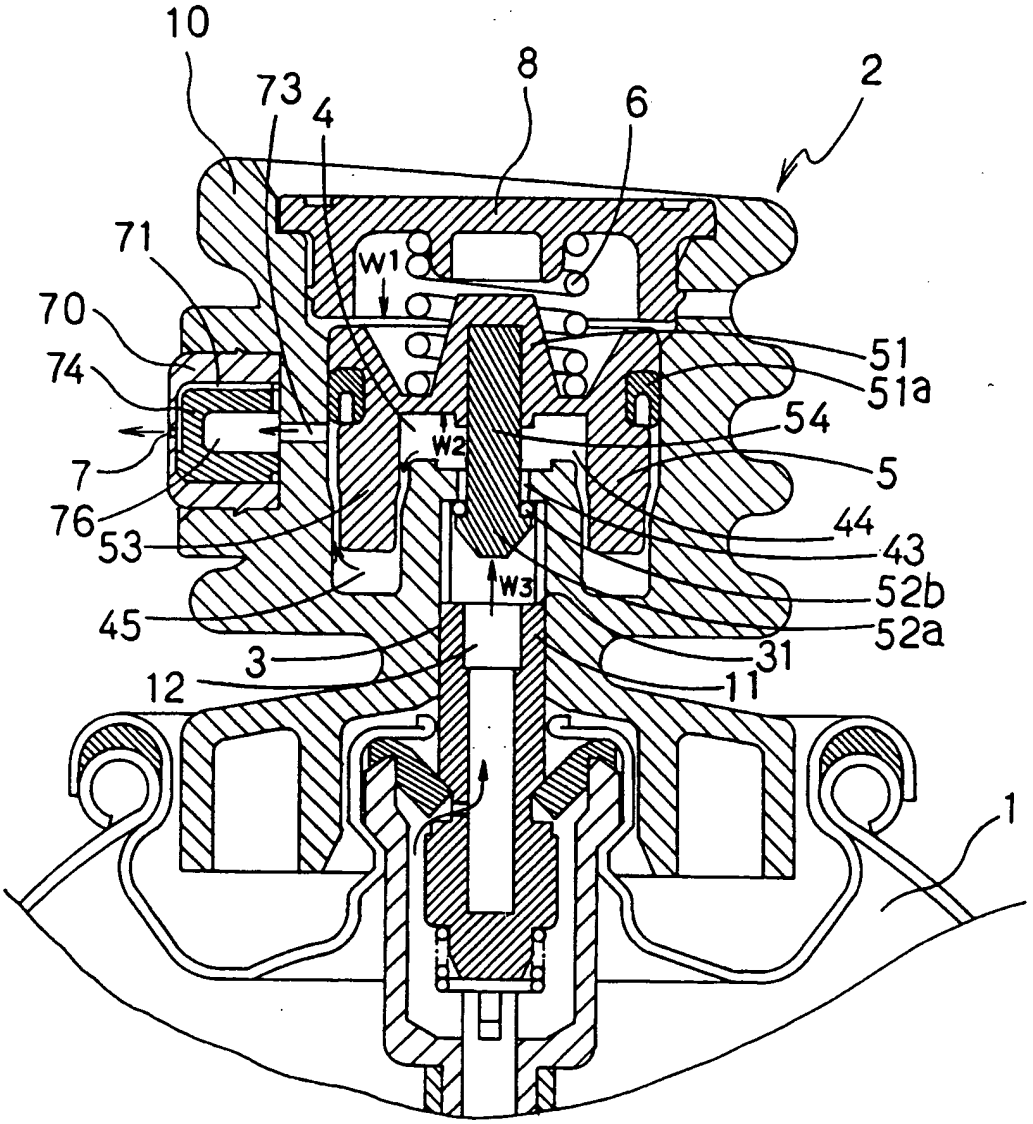

10
73
4
8
6
2
71
W1
70
74
51
51a
54
W2
7
5
76
53
44
43
W3
52b
45
52a
3
31
12
11
1

FIG. 4

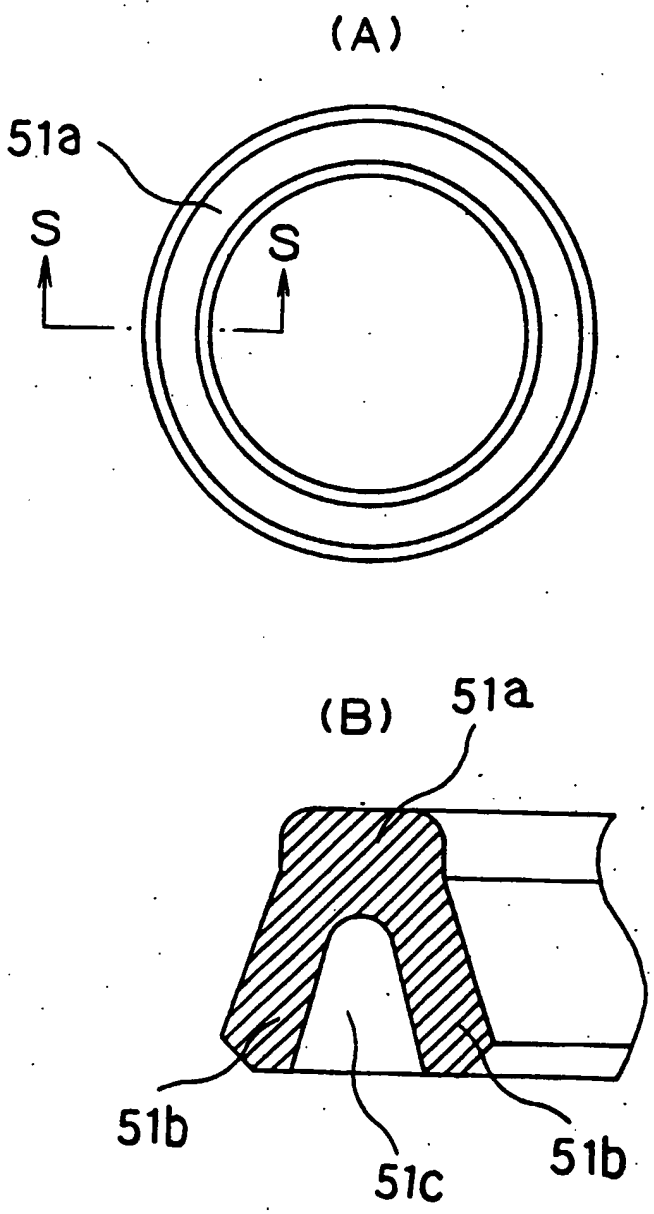
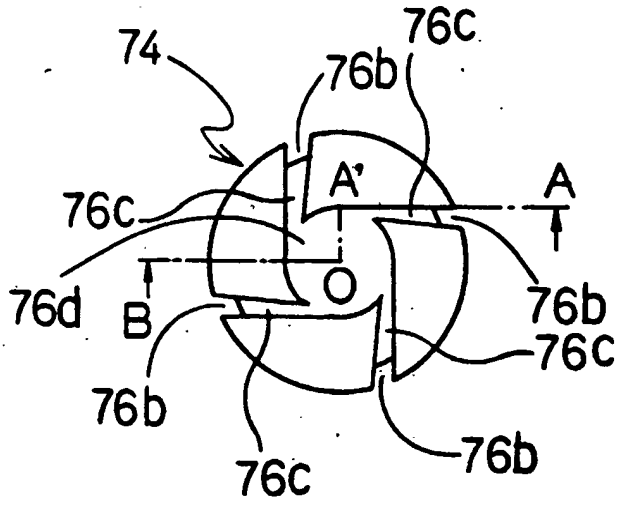
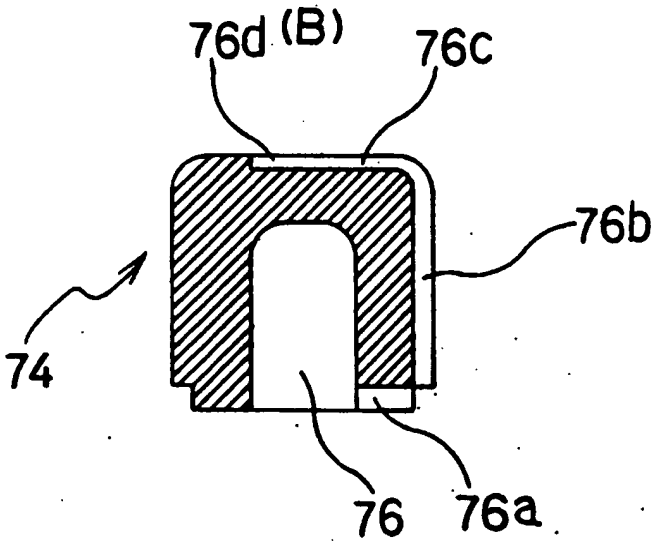


FIG.5

(A)


74
76c
76b
A'
A
76c
76d
B
O
76b
76b
76c
76c
76b


76d
(B)
76c
76b
74
76
76a

(C)

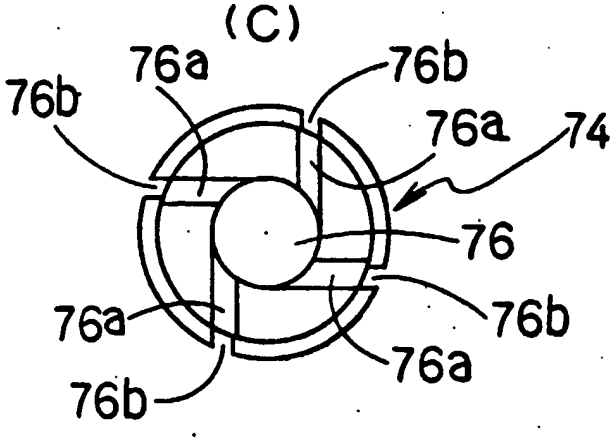
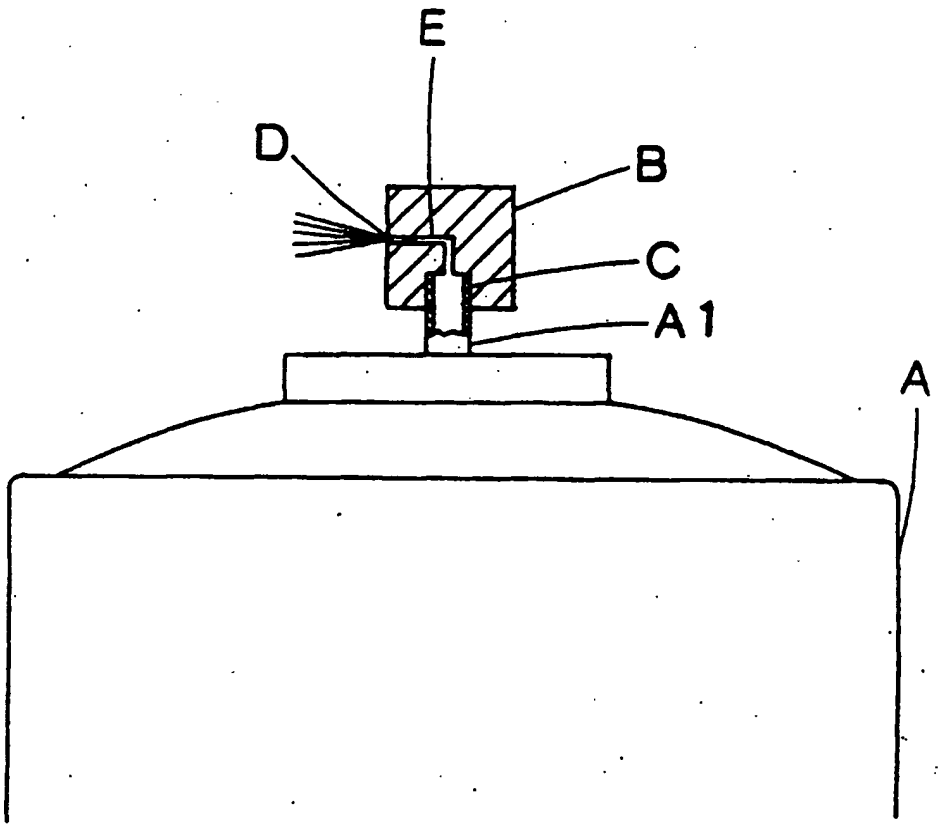

76a
76b
76b
76a
74
76
76a
76b
76b
76a

FIG. 6



Background of the Invention:

The present invention relates to an improvement of a spray mechanism of aerosol product for injecting spray liquid from a container by gas pressure by means of a vaporized gas for spraying.

As the spraying mechanism of aerosol product using vaporized gas as spraying gas, and injecting the spray liquid from the container by the gas pressure of this spraying gas, for example, the construction as shown in Fig. 6 has been hitherto known.

This mechanism comprises a container A, a control member B, a nozzle fitting hole C for fitting the control member B to the tip of the nozzle A1 of the container A, a spray hole D and, between the nozzle fitting hole C and the spray hole B, a leading path E for communication between the two, and is designed in such a way that the spray liquid inside the container A may pass through the nozzle A1 and the leading path E to be sprayed from the spray hole D as the control member B attached to the tip of the nozzle A1 of the container A is pressed downward.

With the construction as shown in Fig. 6, as the spray liquid in the container A decreases by consumption, the gas space gets larger and the internal pressure in the container drops. As a result, a problem is presented that, while the spray liquid can be sprayed abundantly and forcibly in the initial period of use when the container A is filled with a sufficient amount of spray liquid and gas, it can no longer be sprayed in any sufficient amount and the state of atomization also deteriorates because of a drop of spraying force in the later period of use when the residual volume of spray liquid is reduced.

Moreover, though illustration is omitted, as spray mechanism of aerosol product other than the type described above, the so-called tilt type is widely used hitherto which is designed to make spraying through an spray hole by tilting the nozzle of the container.

In the same way as the above-describe type, this tilt type is also constructed in such a way that the spray liquid pushed out from the nozzle A1 by the gas passes through the leading path E and sprayed from the spray hole D. Therefore, this tilt type also has the same problem as that of the above-mentioned type i.e. weaker spraying force and poorer atomization state of spray liquid in the later period of use compared with the initial period.

On the other hand, those conventional aerosol product spraying mechanisms were developed on the precondition that liquefied gas as represented by chlorofluorocarbon be used as spraying gas. This liquefied gas gradually vaporizes in proper amount inside the container A and constantly maintains the pressure inside the container about constant from the start of use up to the end of use and, therefore, the problems of drop of spraying force and deterioration in the state of atomization were not so clearly actualized.

However, disuse of chlorofluorocarbon has been decided from the viewpoint of environmental production, and it is also feared that use of other liquefied gases such as LPG, etc. may become difficult in the near future for reason of danger inherent in those gases. For that reason, attempts are being made today to use vaporized gas such as CO2, N2, O2, etc. as spraying gas.

Those vaporized gases (especially N2) are not dissolved well in the spray liquid, and the greater part of them are stored in the contained in vaporized state. For that reason, when used in the conventional spraying mechanism of aerosol product, the spray liquid is released at a high pressure in the early period of use but, with continued use, the gas space increases, the gas pressure in the container drops and, in the later period of use, the internal pressure of the container becomes extremely low. As a result, the problems of drop of spraying force and deterioration in the state of atomization are actualized.

Furthermore, when liquefied gas is used, part of the liquefied gas is sprayed together with the spray liquid. For that reason, while part of the liquefied gas also achieved the function of atomizing the spray liquid by being vaporized instantly as it comes out of the nozzle A1, the vaporized gas, which is not dissolved so well in the spray liquid, also produced the problem of poor state of atomization in the spraying.

The object of the present invention, devised in view of such circumstances, is to provide a spray mechanism of aerosol product capable of maintaining constant spraying condition and state of atomization at all times from the beginning to end of use even with vaporized gas.

Another object of the present invention is to provide a spray mechanism of aerosol product capable of spraying in a good state of fine atomization even with the use of vaporized gas.

Brief Summary of the Invention:

The present invention solves said problems by providing a spray mechanism of aerosol product having the following characteristics:

The spray mechanism of aerosol product of the present invention comprises a container 1 containing at least the liquid to be sprayed and the vaporized gas for spraying and provided with a control member 2 having a spray hole 7, so that, when the control member 2 is manipulated, he spray liquid is sent to the spray hole 7 by the gas pressure of the spraying gas through the nozzle hole 12 in the nozzle 11 provided on the container 1.

Said control member 2 comprises a control part 31 for manipulating the nozzle 11 so as to inject the spray liquid through the nozzle hole 12, a regulator mechanism unit communicating with the nozzle hole 12, and a spraying member 70 communicating with this regulator mechanism unit.

Said regulator mechanism unit comprises a space 4 formed at the front end side of the nozzle 11 in the control unit 2 a sliding member 5 provided slidably in the space 4, and thrusting means 6 for constantly thrusting the sliding member 5 to the nozzle 11 side.

This space 4 comprises a nozzle opening 41 formed at the front end side of the nozzle 11 so as to communicate with the nozzle hole 12, a pool 44 leading to this nozzle opening 41, and a connection hole 43 communicating between the two.

Said sliding member 5 comprises a partition wall 51 disposed in the space, and a shielding part 52 disposed in the nozzle opening 41 and connected to the partition wall 51 to be movable together with the partition wall 51.

And this sliding member 5 slides in the direction in resistance to the thrusting force W1 of the thrusting means 6 by receiving pressures W2, W3 superior to the thrusting force W1 of the thrusting means by the spray liquid and gas released from the nozzle hole 12.

Said shielding part 52 is intended to shield the connection hole 43 by blocking it from the nozzle 11 side along with the sliding motion of the sliding member 5 resisting the thrusting force W1 of the thrusting means.

As the partition wall 51 slidably gets in close contact with the wall face of the space 4, there is formed inside the space 4 at least one pool 44 communicating with the nozzle opening 41 and temporarily storing the spray liquid and gas partially dissolved in the spray liquid inflowing through this nozzle opening 41.

The space 4 communicates with the spray member 70 through communicating hole 73.

Inside the spray member 70 is disposed an injection chip 74, and about at the center of this injection chip 74 is formed a reservoir 76 for storing the spray liquid and gas, and a plural number of grooves 76a, 76b, 76c are formed from the opening of this reservoir 76 to constitute a narrow passage communicating with the spray hole 7.

The spray liquid and gas, which are stored in the pool 44 until reaching the prescribed internal pressure, are introduced into the reservoir 76 of the injection chip 74, sent to the spray hole 7, and the spray liquid can be sprayed from the spray hole 7.

Moreover, the present invention provides a spray mechanism of aerosol product characterized in that it is provided, in the space 4, with a plural number of pools 44, 45 capable of storing the spray liquid and gas.

Furthermore, the present invention provides a spray mechanism of aerosol product characterized in that a ring-shaped sealing member 51a having elasticity is provided on the sliding face of the sliding member 5 which makes sliding motion in the space 4, and that the section of this sealing member 51a is formed about in the shape of character V or U.

Still more, the present invention provides a spray mechanism of aerosol product characterized in that in said container are stored spray liquid, optional liquefied gas dissolved in this spray liquid and vaporized gas for spraying.

The present invention is characterized in that the control member 2 is provided with a regulator mechanism unit having one or a plural number of pools 44, 45 for temporarily storing the spray liquid released at proper pressure from the nozzle hole 12, and a reservoir 76 is also provided in the injection chip 74 inside the injection member 70 comminicating with those pools 44, 45, so as to store the spray liquid and gas in the pools 44, 45 to make the internal pressure of the pools 44, 45 inside the regulator mechanism unit go up to the prescribed pressure and, with that prescribed pressure, send the spray liquid entering in the pools 44, 45 to the injection member 70, and to further send it to the spray hole 7, through the injection chip 74 inside the injection member 70 and the reservoir 76 and a narrow passage in it.

As a result, the spray liquid released at proper pressure from the nozzle hole 12 once gets into those pools 44, 45 and reservoir 76 and, after reaching the prescribed pressure there, is sent to the spray hole 7.

Therefore, regardless of the internal pressure of the container by spraying gas, the spray liquid can be sprayed from the spray hole 7 at the prescribed pressure which is constantly maintained in the pools 44, 45 and the reservoir 76.

Moreover, by providing a plural number of pools, etc., it also becomes possible to minimize leakage of spray liquid (called "after-draw") from the spray hole 7 even when the injection is stopped with stopping of pressurization of the control member 2.

Furthermore, by dissolving an optional liquefied gas in the spray liquid, it becomes possible for the liquefied gas to vaporize to atomize the spray liquid at the time of injection of the spray liquid.

Brief description of the drawings:

Fig. 1 is an explanatory drawing of the internal structure of an embodiment of the present invention.

Fig. 2 is an explanatory drawing of the internal structure indicating the spraying state of an embodiment of the present invention.

Fig. 3 is an explanatory drawing of the internal structure indicating the spraying state of an embodiment of the present invention, and shows the state in which the connecting hole communicating between the nozzle opening and the pool is closed.

Fig. 4 indicates the sealing member used for an embodiment of the present invention, (A) being a plan view and (B) being an S-S sectional view thereof.

Fig. 5 indicates the injection chip used for an embodiment of the present invention, (A) being a plan view, (B) a sectional view of the line A'-A-O-B in the previous drawing and (C) a bottom view.

Fig. 6 is an explanatory sectional view of a prior art.

Detailed Description of the Preferred Embodiments:

An embodiment of the present invention will be described concretely based on the drawings hereafter.

Fig. 1 is an explanatory drawing of expanded section of the essential part of an embodiment of the present invention, and Fig. 2 and Fig. 3 are explanatory drawings of expanded section of the essential part of the spraying state.

The spray mechanism of aerosol product of the present invention comprises a container 1 and a control member 2 attached to this container 1.

The container 1 to which this control member 2 is attached is similar to a conventional one, and filled with vaporized gas such as air, carbon dioxide, nitrogen, laughing gas, oxygen, helium, etc., as spraying gas. In addition, at the top of this container 1 is provided a cylinder-like nozzle 11 having a nozzle hole 12.

The nozzle 11 in this embodiment is designed in such a way that the spray liquid is injected from the nozzle hole 12 when the nozzle 11 is pressed downward and that the nozzle 11 is pushed up by the thrusting means provided on the nozzle 11 to stop the sending out of spray liquid when the pressing down is stopped, but this nozzle 11 may also be realized as tilt type which injects the spray liquid when the nozzle is tilted by pressing.

The control member 2 comprises a body unit 10, an operating unit provided in this body unit 10, a regulator mechanism unit, and a spraying member 70 having a spray hole 7.

The operating unit is composed of a nozzle fitting hole 3 formed at the bottom center of the body unit 10. This nozzle fitting hole 3 is provided with a nozzle top end face contact part 31 by forming a stepped part at the top of which the top edge of the nozzle 11 can get in contact.

This nozzle top end face contact part 31 is realized in such a way that only the top part of the nozzle 11 fits so that the top end face of the nozzle may be in contact with this part, and this nozzle top end face contact part 31 can be operated to push down the nozzle with pressing down of the control member

The regulator mechanism unit is realized by comprising, inside a roughly cylindrical space (4) formed at the center of the control member 2, a sliding member 5 disposed in a way to slide in the axial direction (vertical direction in the drawing) of the nozzle 11 and a thrusting means 6 for constantly thrusting this sliding member 5 to the nozzle 11 (downward direction in the drawing) side.

Above the thrusting means 6 is fixed an upper lid 8.

The sliding member 5 consists of a cylindrical member having a bottom 51 at the upper part, and this bottom part 51 serves as partition wall. In addition, the sliding member 5 also has a protrusion 54 extending downward, from the center of its bottom part 51 and a shielding part formed at the tip of this protrusion 54.

Above the nozzle top end face contact part 31 provided inside the bottom center of the body unit 10 is formed a nozzle opening 41, and below the bottom part 51 of the sliding member 5 is formed a reservoir or pool 44, and a connecting hole 43 is provided for communication between those nozzle opening 41 and pool 44.

In this embodiment, the connecting hole 43 is formed, on the nozzle opening 41, by keeping the inside diameter of the partition of the body unit 10 smaller than the inside diameter of the nozzle opening 41. This makes it possible to form a stepped part at the border with the nozzle opening 41.

On the outer circumferential face of the cylindrical periphery 53 is provided a ring-shaped groove, and a ring-shaped sealing member 51a is provided in this groove as sealing means. This cylindrical periphery 53 serves as the sliding face of the sliding member 5.

A reservoir or pool 45 is formed in the shape of a ring also between the bottom end of the cylindrical periphery 53 of the sliding member 5 and the inner wall of the body unit 10.

In this way, as the sealing member 51a tightly seals between the sliding member 5 and the partition of the body unit 10, the pools 44, 45 formed between the sliding member 5 and the inner wall of the body unit 10 are completely separated from the thrusting means housing 42, and can temporarily store the spray liquid released at proper pressure from the nozzle hole 11 of the container 1 without allowing the spray liquid inside the container 1 flowing into the pools 44, 45 to pass into the thrusting means housing 42. Moreover, as a matter of course, between those pools 44, 45 and also between this pool 45 and the injection member 70 is provided a passage communicating between them respectively.

Those passages are intended to not only hold the spray liquid and gas in the pools 44, 45 to raise the internal pressure in the pools 44, 45 to the

prescribed pressure but also send the spray liquid flowing into the pools 44, 45 to the spraying member 70 at that prescribed internal pressure. In this embodiment, those communicating passages are realized in a way to form a narrow clearance between the sliding member 5 and inner wall of the body unit 10 to demonstrate said effects.

The passage communicating from the pool 45 to the spraying member 70 passes through the communicating hole 73.

The protrusion 54 is a round bar, the shaft diameter of which is formed smaller than said connecting hole 43 formed between the nozzle opening 41 and the pool 44, and its front end side extends to the inside of the nozzle opening 41 passing through the connecting hole 43.

The shielding part 52 at the front end of the protrusion 54 is disposed in the nozzle opening 41, and is composed of a flange 52a and a shielding member 52b. The flange 52a has an upper outer diameter larger than the diameter of the connecting hole 43 but smaller than the diameter of the nozzle opening 41, while its lower surface is formed as a flat plane, disposed in such a way that the entire bottom surface is orthogonal to the axial direction of the nozzle 11, and is formed so that the spray liquid and gas inside the container 1 sent out from the nozzle hole 12 may hit against this bottom face.

On the other hand, the shielding member 52b is made of an elastic O ring for sealing, and extends around the protrusion 54 in the upper part of the flange 52a. The outer diameter of this shielding member 52b is larger than the diameter of the connecting hole 43 in the state wound around the protrusion 54, and can therefore seal the connecting hole 43.

As thrusting means 6, a cylindrical coil spring is used in this embodiment and disposed in the thrusting means housing 42 by being set between the bottom part 51 and the top lid 8 in such a way that the lower end gets in touch with the top face of the bottom part 51 and the upper end gets in contact with the lower face of the top lid 8 respectively.

As shown in Fig. 1, during a period of non use when the spray liquid and gas from the nozzle 11 are not sent into the pools 44, 45, the communicating hole 73 is in the state blocked by the sealing member 51a.

The sealing member 51a may be disposed, during said period of non use, not at a position closing the communicating hole 73 but at a position opening the communicating hole 73, i.e. a position slightly above the communicating hole 73.

The spray hole 7 is provided, in this embodiment, on the spraying member 70 which consists of a material separated from the body unit 10, and this spraying member 70 is attached to the portion of communicating hole 73 of the body unit 10 of the control member 2.

This spraying member 70 is formed with a spraying unit body 75 composed of bottomed cylindrical material having a spraying hole 7 on the left side in the drawing and a injection chip 74 composed of a cylindrical material disposed inside this spraying unit body 75.

This injection chip 74 has a small reservoir 76 provided at the center and a leading path 71 formed on its outer circumference. This leading path 71 is formed, as described in detail later, with a narrow gap formed by a plural number of grooves made on the inner circumferential face of the spraying unit body 75 and on the outer circumferential face of the injection chip 74.

The spraying hole 7, which is a tiny hole, atomizes the spray liquid pushed out from the leading path 71. And, as this spraying member 70 is engaged with the spraying member fitting hole 2a provided on the outer wall of the control member 2, communication is established between the communicating hole 73 of the body unit 10 and the leading path 71 and, because the leading path 71 is formed narrow and the spray hole 7 is formed small, the sending out of the spray liquid and the gas sent into the reservoir 76 is restricted during the period until they are sprayed from the spray hole 7 by passing through the communicating hole 73, thus playing a function similar to that of said communicating passage in the regulator mechanism unit.

Next, explanation will be given on the operation of this spraying mechanism.

First, the nozzle 11 of the container 1 is engaged in the nozzle fitting hole 3 of the control member 2, and the control member 2 is attached to the container 1. In this state of mounting, the sliding member 5 is thrust downward by the cylindrical coil spring 6 as shown in Fig. 1, the sealing member 51a of the cylindrical outer circumference 53 of the sliding member 5 is in the state of blocking the comminicating hole 73, and the shielding unit 52 is positioned about at the center of the nozzle opening 41, thereby keeping open the connecting hole 43.

Next, press the top face of the control member 2 with a finger. With this operation, the nozzle 11 is pushed downward by the nozzle top end face contact part 31 of the nozzle fitting hole 3 and, as a result, the spray liquid in the container 1 is sprayed from the nozzle hole 12 by the pressure of the vaporized gas inside the container 1.

The injected spray liquid hits against the bottom face of the shielding unit 52 to exert an upward pressure W3 on it and also flows into the pool 44 by passing through the open connecting hole 43 from the gap between the outer circumference of the shielding unit 52 and the inner circumference of the nozzle opening 41.

When a certain amount of spray liquid and vaporized gas gets into the pool 44, the internal pressure W2 in the pool 44 goes up with the spray liquid pushed out by the vaporized gas. At that time, the spray liquid which got into the pool 44 also flows into the pool 45 by passing through a narrow passage.

In this way, the internal pressure W2 in the pools 44, 45 goes up and, as the sum of the internal pressure W2 acting on the sliding member 5 positioned above the pools 44, 45 and the pressure W3 applied to the bottom face of said shielding unit 52 (W2 + W3) becomes larger than the thrusting force W1 thrusting the sliding member 5 downward with the cylindrical coil spring 6, the sliding member 5 is pushed upward.

If the sliding member 5 is pushed upward, the communicating hole 73 opens and the spray liquid is sent into the reservoir 76 of the injection chip 74. The internal pressure of this reservoir 76 also rises and the spray liquid starts to be injected outside from the spray hole 7 by passing through the leading path 71.

As this state of spraying is maintained and the internal pressure of pools 44, 45 and the reservoir 76 gets higher than the prescribed pressure, i.e. larger than the thrusting pressure W1 of the cylindrical coil spring 6 serving as thrusting means, the sliding member 5 further goes up. As the sliding member 5 is pushed up, the flange 52a of the shielding unit 52 closes the connecting hole 43 by blocking from below as shown in Fig. 3. Therefore, in the pools 44, 45 and reservoir 76, the internal pressure W2 does not go up any more and the spray liquid is sprayed from the spray hole 7 at that internal pressure W2.

As the spray liquid is sprayed in a certain amount, the internal pressure W2 in the pools 44, 45 and reservoir 76 starts decreasing gradually and said sum of pressures W2 + W3 becomes smaller than the thrusting pressure W1 of the cylindrical coil spring 6. This makes the sliding member 5 move downward.
If the sliding member comes down, the feed of the spray liquid and vaporized gas to the spraying member 70 is restricted and the connecting hole 43 gets in open state again. And, again, the spray liquid flows into the pools 44, 45 and reservoir 76, the total pressure W2 + W3 goes up and the spray liquid in the pools 44, 5 is sent into the spraying member 70 through the communicating hole 73, .e. the spray liquid is also sent into the reservoir 76 of the spraying member 70 to promote the injection for continuing spraying at prescribed pressure.

With instant repetition of the above-mentioned motions, the spray liquid is sprayed in the form of mist from the spray hole 7 always at the internal pressure W2.

Therefore, the spray liquid can be sent out always at a constant pressure from the beginning to the end of use and can maintain constant spraying state and state of atomization. Moreover, by using various cylindrical coil springs 6 of different thrusting forces, it becomes possible to adjust to any desired pressure easily as required.

In this embodiment, cylindrical coil spring 6 is used as thrusting means, but other thrusting means may also be used as required.

Moreover, the position for disposing the cylindrical coil spring 6 is not limited to the top face of the bottom part 51 of the sliding member 5 but may be

changed as required by such methods as disposing the cylindrical coil spring 6, in the nozzle opening, between the top face of the shielding unit 52 and the stepped part of the connecting hole 43, or providing thrusting means capable of lowering the bottom part 51 in the portion of the pool 44, i.e. between the bottom face of the bottom part 51 of the sliding member and the inner wall of the body unit 10, etc., for example.

Fig. 4, indicates the sealing member 51a used for the spray mechanism of said embodiment of the present invention, (A) being a plan view and (B) being an S-S end view thereof.

This sealing member 51a is a ring-shaped packing made of flexible and richly elastic synthetic rubber, elastomer or synthetic resin, etc. This sectional shape is shaped, as it is apparent from the end face drawing in Fig. 4 (B), in the form of reversed character V or reversed character U, has 2 legs 51b below and also has a space 51c between the legs.

By adopting this shape, it becomes possible to avoid the problem of spoiling smoothness with swelling as seen with ordinary sealing packings not having said space 51c.

Moreover, by using this sealing member 51a, it becomes possible to improve the tightness between the sliding member and the inner wall of the space 4, and to better prevent leakage of spray liquid (called "after-draw") from the spray hole when stopping the injection by stopping the pressing of the control member 2.

Fig. 5 indicates the injection chip 74 disposed in the spraying member 70 used for said embodiment, (A) being a plan view, (B) a sectional view of the line A'-A-O-B in the previous drawing and (C) a bottom view.

As it is seen from the sectional view, at the center of this injection chip 74 is formed a reservoir 76 composed of an about cylindrical hole for storing the spray liquid, and groove 76a is formed about radially in 4 directions from the opening of this reservoir 76 (see Fig. 5 (C)). And from this groove 76a is provided groove 76b in the axial direction on the outer circumferential face of the injection chip 74 continuously from this groove 76a, and groove 76c is further provided toward the concavity 76d provided at the center on the top of the injection chip 74 from this groove 76b (see Fig. 5 (A)).

Therefore, the spray liquid sent from the communicating hole 73 of the body unit 10 of the control member 2 first stays in the reservoir 76 of the injection chip 74 and then passes from the opening of the reservoir 76 through the groove 76a formed about radially, passes through the groove 76b provided on the outer circumferential face of the injection chip 74 and further passes through the groove 76c formed on the end face of the spray hole 7 of the injection chip 74 to reach the concavity 76c at its center and be injected to outside from the spray hole 7 of the spraying member 70.

Those grooves 76a, 76b, 76c form the leading path 71 (see Fig. 1 to Fig. 3). Because those grooves 76a, 76b, 76c are very narrow passages, the internal pressure of the pools 44, 45 in the control member 2 and the reservoir 76 in the injection chip 74 easily goes up by the pressure of the spray liquid and spray gas which are sent in from inside the container 1.

And, as the pressure in the pools 44, 45 drops, the connecting hole 43 opens immediately by the action of the thrusting means 6 to feed spray liquid and, if its pressure goes up, the connecting hole 43 closes, thus maintaining the internal pressure W2 of the pools 44, 45 about constant at all times.

A variety of vaporized gases are used as spraying gas. Because those vaporized gases (especially N2) are difficult to dissolve in the spray liquid, it is rather difficult to atomize the spray liquid and obtain fine mist.

For that reason, though its is also possible to embody this invention by storing the spray liquid and vaporized gas only in the container 1, it is more preferable to store a small amount of liquefied gas in the container 1 by dissolving it in the spray gas.

As liquefied gas, LPG, DME (dimethyl ether) and other liquefied gases can be used as desired.

Because this liquefied gas can be easily dissolved in the spray liquid, it is sprayed from the spraying hole 7 into the atmosphere together with the spray liquid. As the liquefied gas swells by sudden vaporization, the spray liquid also turns into fine mist.

In this way, liquefied gas is used for the purpose of turning the spray liquid into fine mist after the spraying, and only a very small amount is enough as the dosage of liquefied gas in the spray liquid, because the injection itself of the spray liquid is performed by the pressure of the vaporized gas.

LPG dissolves well in alcohol but hardly dissolves in water and, moreover, the range of amount available for dissolution also changes depending on the set pressure of spraying, i.e. the pressure in the container 1 by vaporized gas.

Table 1 shows a concrete example of the relation among the spray liquid, liquefied gas and set pressure for injection, i.e. the pressure in the container 1 by vaporized gas.
Id=[Table 1] Columns=6

Head Col 1:
Head Col 2: Injection set pressure
Head Col 3 to 4 AL=L: Spray liquid
Head Col 5 to 6: Liquefied gas
(A) 1 kg/cm<2> 99% alcohol 100 wt LPG 5.26 wt
(B) 2 kg/cm<2> Same as (A) LPG 10.87 wt
(C) 3 kg/cm<2> Same as (A) LPG 20.67 wt

(D) 1 kg/cm<2> Same as (A) DME 11.36 wt
(E 2 kg/cm<2> Same as (A) DME 27.03 wt
(F) 3 kg/cm<2> Same as (A) DME 52.08 wt
(G) 1 kg/cm<2> Refined water 100 wt DME 4.79 wt
(H) 2 kg/cm<2> Same as (G) DME 9.50 wt
(I) 3 kg/cm<2> Same as (G) DME 14.60 wt
(J) 1 kg/cm<2> 99% alcohol 50 wt LPG 0.50 wt
Refined water 50 wt
(K) 2 kg/cm<2> Same as (J) LPG 1.00 wt
(L) 3 kg/cm<2> Same as (J) LPG 1.60 wt
(M) 1 kg/cm<2> Same as (J) DME 8.92 wt
(N) 2 kg/cm<2> Same as (J) DME 20.01 wt
(O) 3 kg/cm<2> Same as (J) DME 34.51 wt
<#s> 1 kg/cm<2>99% alcohol30 wtLPG0.27 wt
Refined water 70 wt
(Q) 2 kg/cm<2> Same as (P) LPG 0.57 wt
(R) 3 kg/cm<2> Same as (P) LPG 0.95 wt
(S) 1 kg/cm<2> Same as (P) DME 6.53 wt
(T) 2 kg/cm<2> Same as (P) DME 14.51 wt
(U) 3 kg/cm<2> Same as (P) DME 26.79 wt

This Table 1 shows the possible range of the dissolved amount of liquefied gas in the case where spray liquid and injection set pressure are given. To explain concretely by taking (A) in Table 1 for example, it shows that, in the case where the inject set pressure i.e. the pressure in the container 1 by vaporized gas is 1 kg/cm<2>, the liquefied gas composed of LPG can be dissolved to an amount of 5.26 wt in 100 wt of spray liquid made of 99 % alcohol. Therefore, what is to be done is to dissolve a proper amount no more than 5.26 wt of liquefied gas composed of LPG in 100 wt of spray liquid made of 99% alcohol and store it in the container 1. In Table 1, the temperature of spray liquid and liquefied gas is 25 and, at this temperature, LPG has a pressure of 4. kg/cm<2> and DME has a pressure of 4.7 kg/cm<2>.

Thus, in the present invention, the spray liquid to be injected from the nozzle hole at a proper pressure from the pools and the reservoir is once stored in those pools and reservoir, and is sent into the spray hole after being raised to the prescribed pressure, and therefore the spray liquid can be injected from the spray hole always at prescribed pressure constantly remaining in the pools and reservoir regardless of the internal pressure of the container.

This makes it possible to send out the spray liquid, staying always in the pools, etc. from beginning to end of use, at a constant pressure, hereby maintaining constant spraying state and state of atomization.

Moreover, in said embodiment, two pools 44, 45 are provided and the sliding member 5 has an outer circumference 53 of cylindrical shape, and this cylindrical outer circumference 53 serves as guide for vertical sliding, enabling smooth vertical slide without causing any rolling of the sliding member 5.

Moreover, by providing two pools 44, 45, it became possible to reduce the size of the respective pools and thereby reduce leakage of spray liquid (called "after-draw") at stopping of the injection.

Furthermore, by dissolving a desired liquefied gas in the spray liquid, it becomes possible to vaporize the liquefied gag into fine mist at the time of injection of the spray liquid to realize better spraying.

As it has been described so far, the present invention provides a spray mechanism of aerosol product capable of maintaining constant spray state and state of mist at all times from beginning to end of use, even in the case where the spray liquid is injected by vaporized gas.

The present invention has been described above purely by way of example, and modifications can be made within the spirit of the invention. The invention also consists in any individual features described or implicit herein or shown or implicit in the drawings or any combination of any such features or any generalisation of any such features or combination.

CLAIMS

1. A spray mechanism of aerosol product, in which a container 1 containing at least a spray liquid and a spraying gas in its inside is provided with a control member 2 having a spray hole 7 and, as the control member 2 is manipulated, the spray liquid is sent to the spray hole 7 by the gas pressure of the spraying gas from a nozzle hole 12 of a nozzle 11 provided in the container 1, so that the spray liquid is ejected from the spray hole 7, characterized in

that the control member 2 comprises a control part 31 for manipulating the nozzle 11 so as to inject the spray liquid from the nozzle hole 12, a regulator mechanism unit communicating with the nozzle hole 12, and a spraying member 70 communicating with this regulator mechanism unit,
that the regulator mechanism unit comprises a space 4 formed at the front end side of the nozzle 11 in the control member, a sliding member 5 provided slidably in the space 4, and thrusting means 6 for thrusting the sliding member 5 constantly to the nozzle 11 side,
that the space 4 has a nozzle opening 41 formed at the front end side of the nozzle 11 so as to communicate with the nozzle hole 12, a pool 44 communicating with the nozzle opening 41, and a connection hole 43 communicating between the two,
that the sliding member 5 has a partition wall 51 disposed in the space 4, and a shielding part 52 disposed in the nozzle opening 41 and connected to the partition wall 51 to be movable together with the partition wall 51,
that the shielding part 52 is intended to slide in the direction resisting the thrusting force W1 of the thrusting means 6 by receiving pressures (W2, W3) larger than the thrusting force W1 of the thrusting means 6 by the spray liquid and gas released from the nozzle hole 12,
that the shielding part 52 is to shield the connection hole 43 by blocking it from the nozzle side along with the sliding motion of the sliding member 5 in the direction resisting the thrusting force W1 of the thrusting means,
that, as the sliding member 5 slidably gets in close contact with the wall face of the space 4, there is formed in the space 4 at least one pool 44 communicating with the nozzle opening 41 and temporarily storing the spray liquid and gas inflowing from this nozzle opening 41,
that the space 4 communicates with the spraying member 70 through the communicating hole 73,
that inside the spraying member 70 is disposed a injection chip 74, and a reservoir 76 for storing the spray liquid and gas is formed at about the center of this injection chip 74, with a plural number of grooves 76a, 76b, 76c being formed from the opening of this reservoir 76 to constitute a narrow passage communicating with the spray hole 7, and
that the spray liquid and gas stored in the pool 44 until reaching the prescribed internal pressure are introduced into the reservoir 76 of the injection chip 74 through the communicating hole 73, and then sent to the spay hole 7.

2. A spray mechanism of aerosol product as defined in Claim 1, characterized in that a plural number of pools 44, 45 capable of storing the spray liquid and

gas are provided in the space 4.

3. A spray mechanism of aerosol product as defined in Claim 1 or Claim 2, wherein a ring-shaped sealing member 51a having elasticity is provided on the sliding face of the sliding member 5 which makes sliding motion in the space 4, and the section of this sealing member 51a is formed about in the shape of character V or U.

4. A spray mechanism of aerosol product as defined in any of Claim 1 to Claim 3, wherein the container contains a spray liquid, an arbitrary liquefied gas dissolved in the spray liquid, and a vaporized gas agent for spraying.

5. A spray mechanism for an aerosol product, for association with a container 1 having a nozzle 11 and containing at least a spray liquid and a spraying gas, the spray mechanism comprising a control member 2 having an exit spray hole 7 and arranged such that when the control member 2 is actuated, the nozzle 11 is actuated so that the spray liquid is passed to the exit spray hole 7 by the gas pressure of the spraying gas from a hole 12 in the nozzle 11 and the spray liquid is ejected the spray hole 7, characterized in that

the control member 2 comprises a control part 31 for actuating the nozzle 11 so as to eject the spray liquid from the nozzle 11, and a regulator mechanism unit communicating with the nozzle hole 12;
the regulator mechanism unit comprising a space 4 to be downstream of and communicating with the nozzle hole 12 and with the exit spray hole 7, a sliding member 5 in the space 4, and thrusting means 6 for thrusting the sliding member 5 constantly towards the nozzle 11, the space 4 including nozzle opening 41 for communicating with the nozzle hole 12, at least one reservoir 44, 45 communicable with the nozzle opening 41 for temporarily storing the spray liquid and gas flowing from the nozzle opening 41, and a connection hole connecting the reservoir 44, 45 and the nozzle opening 41; and
the sliding member 5 having a valve part 52, 52a, 52b for closing the connection hole 43 and which slides with the sliding member 5 in a direction to close the connection hole 43 when the thrusting force W1 of the thrusting means 6 less than the force W2, W3 applied to the sliding member 5 by the pressure of the spray liquid and gas released from the nozzle hole 12;
whereby manual actuation of the spray mechanism control member 2 causes the spray liquid to pass through the nozzle hole 12 but the passage of spray liquid to the exit spray hole 7 is automatically controlled by the sliding member 5.

6. A spy mechanism for an aerosol product, for association with a container 1 having a nozzle 11 and containing at least a spray liquid and a spraying gas, the spray mechanism comprising a control member 2 having a exit spy hole 7 and arranged such that when the control member 2 is actuated, the nozzle 11 is actuated so that the spray liquid is passed to the exist spray hole 7 by the gas pressure of the spraying gas from a hole 12 in the nozzle 11 and the spray liquid is ejected from the spray hole 7, characterized in that

the control member 2 comprises a control part 31 for actuating the nozzle 11 so as to eject the spray liquid from the nozzle 11, and a regulator mechanism
unit communicating with the nozzle hole 12;
the regulator mechanism unit comprising a space 4 to be downstream of and communicating with the nozzle hole 12, and communicating with the exit
spray hole 7 by way of a communicating opening 73, a sliding member 5 in the space 4, and thrusting means 6 for thrusting the sliding member 5
constantly towards the nozzle 11, the space 4 including at least one reservoir 44, 45 communicable with the nozzle hole 12 for temporarily storing the
spray liquid and gas flowing from the nozzle hole 12; and
the sliding member 5 having a valve part 51 for closing the communicating opening 73 when the thrusting force W1 of the thrusting means 6 is greater than
the force W2, W3 applied to the sliding member 5 by the pressure of the spray liquid and gas released from the nozzle hole 12;
whereby manual actuation of the spray mechanism control member 2 causes the spray liquid to pass through the nozzle hole 12 but the passage of spy
liquid to the exit spray hole 7 is automatically controlled by the sliding member 5, and the spray liquid and gas are stored in the reservoir 44, 45 until
reaching a prescribed internal pressure and are then passed via the communicating opening 73 to the exit spray hole 7.

7. An aerosol product container containing a spray liquid and a spraying gas and having a nozzle 11 engaged with the spraying mechanism of any of the
preceding Claims.